

Ashwin Pananjady

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Education	University of California, Berkeley <i>Ph.D. in Electrical Engineering and Computer Science</i> Interests: Statistical machine learning, convex/combinatorial optimization, information theory <i>Advisors:</i> Martin J. Wainwright, Thomas A. Courtade	2014-present GPA: 3.97/4
	Indian Institute of Technology Madras <i>Bachelor of Technology (with Honours) in Electrical Engineering</i> <i>Advisor:</i> Andrew Thangaraj	2010-2014 GPA: 9.0/10
Professional Experience	Tata Institute of Fundamental Research Mumbai, India Developed algorithms and hardness results for the coverage lifetime problem in WSNs	Undergraduate Research Intern Summer 2013
	Ittiam Systems Pvt. Ltd. Bangalore, India Rewrote hot-spots to optimize Ittiam's H264 video encoder for the x86 platform	Undergraduate Intern Summer 2012
Honours and Awards	Best Paper Award , Networks Track, National Conference on Communications 2014, IIT-K Governor's Gold Medal and Motorola Prize from IIT Madras for being the best all-round graduate in the overall batch and EE/CS batch of 2014, respectively Institute Blues Silver Medal , IIT Madras for extraordinary achievement in cultural, co-curricular and organizational activities Anant H. Pandya Memorial Scholarship for exemplary Indians pursuing graduate studies Certificate of merit, Government of India for all-India Rank 301 out of 470,000 in the IIT Joint Entrance Exam (IITJEE) 2010 Rank 11 (Medicine), 36 (Engineering) out of 100,000+, Karnataka Common Entrance Test Special Mention, Indian National Math Olympiad , 2009. Certificate of merit for proficiency in high school mathematics. First place, Regional Math Olympiad , 2009 National Talent Search Scholarship , 2009, given to a select few students across India Rotaract Award 2008 for the best performance in the ICSE X board, Bangalore region	
Journal Publications/Preprints	A. Pananjady , M. J. Wainwright, T. A. Courtade, "Linear Regression with Shuffled Data: Statistical and Computational Limits of Permutation Recovery," submitted to <i>IEEE Trans. on Information Theory</i> , 2016 A. Pananjady , T. A. Courtade, "The Effect of Local Decodability Constraints on Variable-Length Compression," submitted to <i>IEEE Trans. on Information Theory</i> , 2015 A. Pananjady , V. K. Bagaria, R. Vaze, "Optimally Approximating the Coverage Lifetime of Wireless Sensor Networks," <i>IEEE/ACM Trans. on Networking</i> , accepted 2016 S. Mishra, A. Pananjady , N. S. Devi, "On the Complexity of Making a Distinguished Vertex Minimum Degree by Vertex Deletion," <i>Elsevier Journal of Discrete Algorithms</i> , July 2015	
Conference Publications	A. Pananjady , M. J. Wainwright, T. A. Courtade, "Linear Regression with an Unknown Permutation: Statistical and Computational Limits," <i>Allerton Conference on Communication, Control, and Computing</i> , 2016 A. Pananjady , T. A. Courtade, "Compressing Sparse Sequences under Local Decodability Constraints," <i>IEEE International Symposium on Information Theory (ISIT)</i> , 2015 A. Pananjady , V. K. Bagaria, R. Vaze, "The Online Disjoint Set Cover Problem and its Applications," <i>IEEE Conference on Computer Communications (INFOCOM)</i> , 2015 A. Pananjady , V. K. Bagaria, R. Vaze, "Maximizing Utility Among Selfish Users in Social Groups," <i>Twentieth National Conference on Communications (NCC)</i> , 2014. Best paper award , Networks track	

Talks	<p>“Compressing Sparse Sequences under Local Decodability Constraints,” <i>ISIT</i>, June 2015</p> <p>“The Online Disjoint Set Cover Problem and its Applications,” <i>INFOCOM</i>, April 2015</p> <p>“Optimization and Scheduling: Tackling hard communications problems through probabilistic algorithms,” invited talk, <i>CSIR Fourth Paradigm Institute, Bangalore</i>, August 2014</p> <p>“Maximizing Utility Among Selfish Users in Social Groups,” National Conference on Communications 2014, <i>IIT Kanpur</i></p>
Research Projects	<p>Learning with Shuffled Data 2016-present <i>UC Berkeley, with Prof. Martin Wainwright and Prof. Thomas Courtade</i></p> <ul style="list-style-type: none"> • Analyzed fundamental limits of linear regression with an unknown permutation, precisely quantifying the conditions under which data can be unshuffled. • Derived minimax bounds in prediction error for general functions with shuffled data. <p>Compressing Sparse Sources under Local Decodability Constraints 2014 - 2015 <i>UC Berkeley, with Prof. Thomas Courtade</i></p> <ul style="list-style-type: none"> • Showed that sparse sources are not highly compressible under local decodability constraints. Analyzed the interplay between decoding complexity and compressibility. • Showed a tight bound for a variant of the dictionary problem in bit-probe complexity. <p>Variants of the Cover Decomposition Problem 2013 - 2014 <i>IIT Madras, TIFR Mumbai, with Prof. Andrew Thangaraj and Prof. Rahul Vaze</i></p> <ul style="list-style-type: none"> • Derived a lower bound on the competitive ratio of the online cover decomposition problem and showed an efficient online algorithm that nearly matched the bound. • Analysed the integrality gap of an exponential LP formulation of cover decomposition. <p>Adversarial vertex deletion in graphs 2013 - 2014 <i>IIT Madras, with Safina Devi and Prof. Sounaka Mishra</i></p> <ul style="list-style-type: none"> • Showed the approximation hardness of vertex deletion in graphs to make a specified vertex minimum degree, and an algorithm that matched this bound for a sub-class of graphs. <p>File Exchange in P2P networks with Selfish Users Summer 2014 <i>TIFR Mumbai, with Vivek Bagaria and Prof. Rahul Vaze</i></p> <ul style="list-style-type: none"> • Showed a probabilistic algorithm for exchange in P2P networks with the give and take paradigm, in which users share files only if they receive hitherto unobtained files. <p>Algorithms for Coverage Lifetime of WSNs Summer 2014 <i>TIFR Mumbai, with Vivek Bagaria and Prof. Rahul Vaze</i></p> <ul style="list-style-type: none"> • Showed a lower bound on the hardness of approximation of the maximum lifetime coverage problem in WSNs, and a provably optimal algorithm matching this bound.
Relevant Course Projects	<p>PGD for model-based sparse PCA Optimization Algorithms, Spring 2016 Showed that projected gradient descent converges geometrically to the optimal solution when initialized suitably, even when the sparsity pattern comes from a particular model. Empirical evidence suggests the same convergence rate for approximate (and fast) projections.</p> <p>Secretary problems with time-varying budgets Graduate Algorithms, Spring 2016 Analyzed secretary problems with budget on the number of secretaries that can be chosen up to each time. Provided guarantees for three different objective functions.</p> <p>Approximate Dynamic Programming Stochastic Control, Spring 2015 Literature survey of constraint sampling methods to solve large linear programs arising from the Bellman recursion for discounted dynamic programming.</p> <p>Band-limited signal sampling on arbitrary graphs Convex Optimization, Fall 2014 Analyzed sampling algorithms for signals on graphs that are band-limited in the Laplacian spectrum. Implemented and analyzed optimization methods for different recovery objectives.</p> <p>Implementing and Decoding LDPC codes Modern Coding Theory, Fall 2013 Constructed large girth LDPC codes from first principles using PEG, implemented a soft-decision based belief propagation decoder. Implemented a non-linear quantizer to reduce the error floor.</p>

Professional Service	<i>Reviewing:</i> IEEE Journal on Selected Areas in Communication, Proceedings of the IEEE, ISIT 2016, INFOCOM 2016, SPCOM 2016 <i>Other:</i> Berkeley Laboratory for Information and System Sciences (BLISS) seminar organizer, BLISS webmaster	
Skills	<i>Programming Languages:</i> C, Java, Python <i>Libraries and Tools:</i> Matlab, Mathematica, Intel Parallel Studio, Adobe Suite	
Graduate Courses	Introduction to Deep Learning Convex Optimization B Theoretical Statistics A, B Statistical Learning Theory Information Theory and Coding Randomized Algorithms in Linear Algebra Random Processes in Systems Digital Communication Real Analysis I and II Game Theory Mathematical Logic	Graduate Combinatorial Algorithms Convex Optimization Algorithms Measure Theoretic Probability Stochastic Control Theory Modern Coding Theory Spectral Graph Theory Physical Applications of Stochastic Processes Communication Networks Mathematical Physics Modern Techniques in the Theory of Computation Computational Systems Biology
Leadership Experience	Literary Secretary, Saraswathi Hostel, 2012-13. Dramatics Coordinator, Saarang 2014 (IITM's annual cultural festival). Sponsorship Coordinator, Shaastra 2014 (IITM's annual technical festival). Sports and Entertainment Quiz Coordinator, Saarang 2013.	
Extra-curricular Activities	At a competitive or semi-professional level: Theatre, scrabble and cryptic crosswords, quizzing, basketball, creative writing, public speaking Other hobbies: Reading, chess, road biking, ultimate frisbee	